Appendix I
General Procedures for Conducting Offshore Sand Inventory Assessment Studies

General Process

The Coastal Engineering Research Center (CERC) has conducted numerous reconnaissance studies for the purpose of identifying potential borrow sites and has provided published guidance to Districts. The generally accepted procedure for conducting these types of investigations consists of a sequence of tasks:

a. Thorough review of existing technical literature from USACE sources, journals, state geological agencies, and universities.

b. Broad-scale reconnaissance geophysical surveys if necessary. Existing data may be substituted if the technical quality and the navigation control comply with present standards.

c. Vibracoring to identify reflectors or recover sediment from areas where acoustic penetration was limited. Cores should be spread throughout the survey area on a rectangular grid or in a pattern that crosses the prevailing trend of the offshore geology. This step can be skipped if cores from previous studies are available.

d. Detailed high-resolution seismic surveys of restricted areas that may be possible borrow sources. Survey tools may include:

(1) Survey echosounder.

(2) 3.5- or 7.0-Khz high-resolution profilers.

(3) Sparker or boomer system for deeper penetration.

(4) Side-scan sonar for identification of surface structure and hazards (debris, pipelines, shipwrecks).

(5) Magnetometer to identify seafloor hazards and cultural resources.

e. Detailed vibracoring and surface grab sampling of the likely borrow sites, based on detailed seismic surveys.

f. Biological surveys and sampling when required by state and Federal regulations.

g. Design studies which compare the suitability of the potential borrow area sediments and economic and environmental comparative analysis to prioritize each potential site.

Seismic Surveys

a. It is generally most satisfactory to run seismic surveys in a pattern that is perpendicular to the prevailing offshore geologic structures or surficial topography. Existing scientific literature and bathymetric maps are available to help guide planning of the surveys. “Exploration and Sampling Methods for Borrow Areas” by Meisberger (1990) is a concise review of survey equipment and planning. This work also lists the reports completed for CERC’s Inner Continental Shelf Sediments Study (ICONS) along the U.S. east coast and Lakes Erie and Michigan.

b. Along most coastlines, seismic lines are run perpendicular to the coast. For example, along southeast Florida, two or three reefs run parallel to the shore and project up from the seafloor. Between the reefs are accumulations of sand of varying thickness. Surveys run perpendicular to the shore can identify the extent of the sand accumulations and the areas of hard bottom.

c. If the prevailing offshore geology is not parallel to the shore, the survey lines should be adjusted to best image the terrain. For example, off Ocean City, Maryland, ridges extend from the shore in a northeast direction. In this area, Field (1979) ran survey lines in a grid at an angle to the shore allowing him to run both parallel and perpendicular to the ridges (Figure 1). Off Cape May, New Jersey, Meisberger and Williams (1980) ran lines in a rectangular grid and collected cores at selected intersection points.

d. For offshore areas where little is known about the surficial geology, an alternative procedure is to run survey lines in a zigzag pattern approximately perpendicular to the coast (Figure 2).

Interpretation of Seismic Data

The interpretation of profiler records is a skill developed over considerable time and with much practice. Subbottom profiles from muddy or silty bottoms are usually easy to interpret because the layering is typically

[1] See Appendix A, “References.”

horizontal and discontinuities, such as sand-filled stream channels, are obvious. Records from sand and mixed bottoms, especially in formerly glaciated areas, are much more difficult to decipher. Meisberger (1990) discusses some fundamentals of profile interpretation, and Sieck and Self (1977) discuss interpretation in greater depth. Theory of signal propagation and data acquisition are reviewed in Sheriff and Geldart (1982).

Side-scan sonograms also require skill and experience to interpret, despite recent advances in digital signal processing and image enhancement. Flemming (1976) reviews methods of sonogram interpretation.

The most satisfactory geophysical survey interpretations usually occur when the surveys are planned and conducted by a combination of geophysicists and coastal geologists with knowledge of the local geology and the project requirements. These same individuals should interpret the records and help select coring sites.

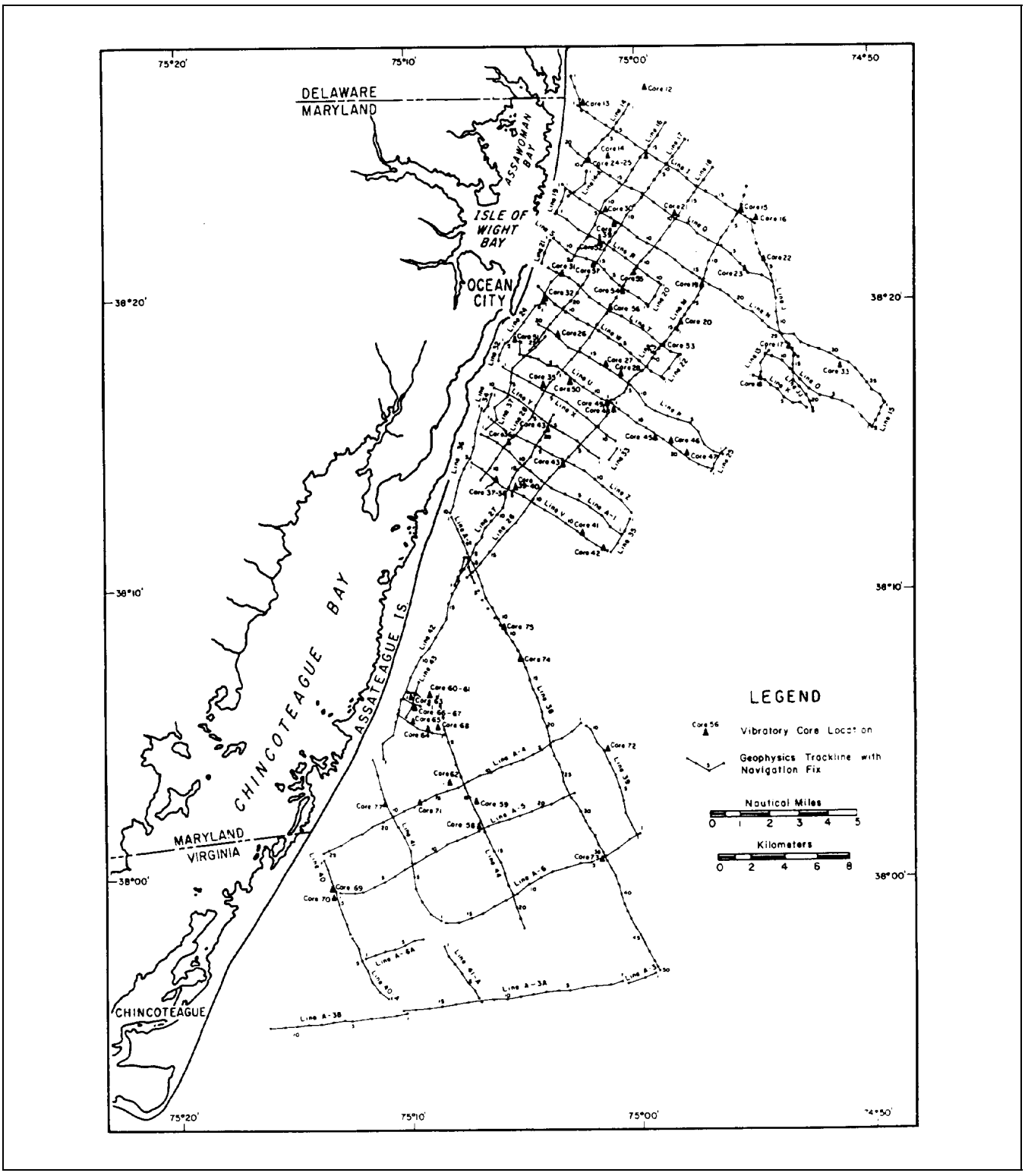

Figure I-1. Rectangle grid survey pattern used by Field (1979) off the Delmarva Peninsula

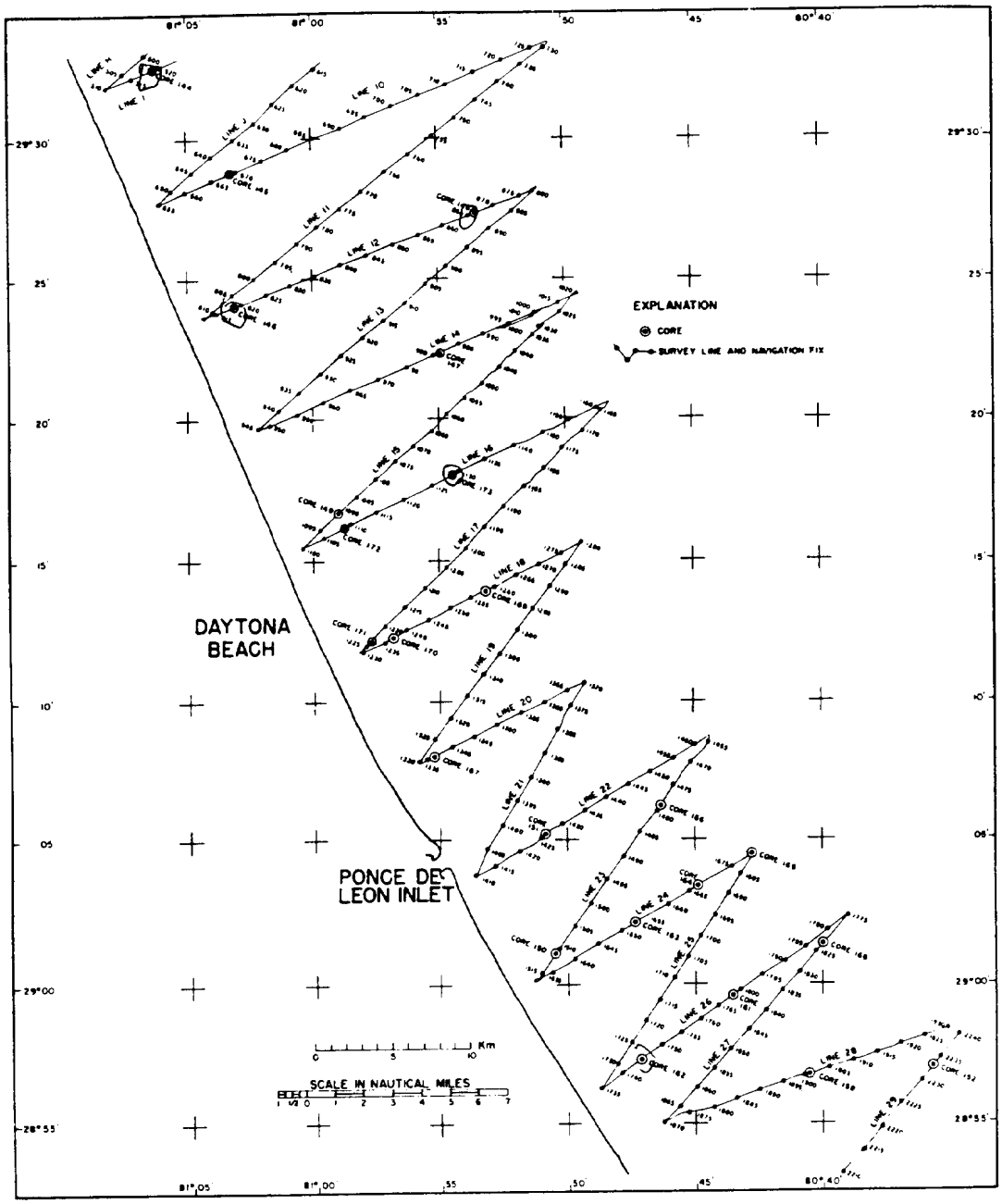

Figure I-2. Zigzag reconnaissance survey pattern from the Florida east coast (from Meisburger (1990))[1]

[1] See references at end of main text.